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EXAMINER	
RIZK, SAMIR WADIE	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/622,742	MALM ET AL.	
	Examiner	Art Unit	
	Sam Rizk	2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *21 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *21 July 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/15/2004, 11/26/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTIONS

- Claims 1-36 have been submitted for examination
- Claims 1-36 have been rejected

Claim Rejections - 35 USC § 101

U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

1. Claim 35 is rejected under 35 U.S.C. 101 because the claim invention is directed to non-statutory subject matter. Each limitation in claim 1 is a computer software program element and is not tangibly embodied. Un-executed Computer programs are non-statutory. Claimed algorithms must produce tangible, useful and concrete results.

2. Claim 36 is rejected for the same reasons as per claim 35.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. US patent no. 6996767 (hereinafter Chang) and further in view of Levy et al. US publication no. 2005/0091568 (Hereinafter Levy).

4. In regard to claim 1, Chang teaches:

A method of decoding Turbo encoded information that comprises first systematic bits, first parity bits, second systematic bits, and second parity bits, the method comprising:

- supplying the first systematic bits (Fig. 6, reference character (611) in Chang) and the first parity bits (Fig. 6, reference characters (612) & (613) in Chang) to a first decoder (Fig. 6, reference character (420) in Chang);
- supplying the second systematic bits (Fig. 6, reference character (614) in Chang) and the second parity bits (Fig. 6, reference characters (615) & (616) in Change) to a second decoder (Fig. 6, reference character (430) in Chang);

- operating the first and second decoders in parallel for a number, m, of half-iterations, wherein m is greater than or equal to 1, wherein for each of the m half-iterations, the first decoder utilizes soft information supplied as an output from the second decoder in a preceding half-iteration, and the second decoder utilizes soft information supplied as an output from the first decoder in the preceding half-iteration;

(Note: Fig. 6, reference characters (420), (430), (460) & (470) and col. 4, lines (30-38) and flow chart of Fig. 10 in Chang)

However, Chang does not teach:

- after one or more of the m half-iterations, deciding whether to stop operating the first and second decoders by comparing an output from the first decoder with an output from the second decoder.

Levy, in analogous art, teaches a method of iteratively decoding a block of information based on a predetermined error detection structure is provided, the method includes: a) performing a sequence of iterations for decoding the block of information to produce a decoded output in each iteration; b) producing from the decoded output, and the predetermined error detection structure, reliability metric for the respective iteration, which reliability metric is based on said predetermined error detection structure; and c) utilizing the reliability metric as a criterion in an abort decision with respect to further iterations of decoding the respective block of information discloses:

- after one or more of the m half-iterations, deciding whether to stop operating the first and second decoders by comparing an output from the first decoder with an output from the second decoder.

(Note: Section [0050], line (3-4) in Levy)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Levy that comprise deciding whether to stop operating the first and second decoders by comparing an output from the first decoder with an output from the second decoder with the teaching of Chang.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized the need to decrease the average number of iterations in a turbo decoding system.

5. In regard to claim 2, Levy teaches:

The method of claim 1, wherein comparing the output from the first decoder with the output from the second decoder comprises:

- comparing a hard decision from the first decoder with a hard decision from the second decoder.

(Note: Section [0050], line (3-4) in Levy)

6. In regard to claim 3, Levy teaches:

The method of claim 2, wherein deciding whether to stop operating the first and second decoders by comparing the output from the first decoder with the output from the second decoder comprises:

- deciding to stop operating the first and second decoders if the hard decision from the first decoder is equal to the hard decision from the second decoder.

(Note: Section [0050], line (4-5) in Levy)

7. In regard to claim 4, Levy teaches:

The method of claim 2, wherein deciding whether to stop operating the first and second decoders by comparing the output from the first decoder with the output from the second decoder comprises:

- determining a Hamming distance between the output from the first decoder and the output from the second decoder; and

(Note: Section 0075] in Levy)

- deciding whether to stop operating the first and second decoders based on a comparison of the Hamming distance with a threshold value.

(Note: Section [0081] in Levy)

8. In regard to claim 5, Levy teaches:

The method of claim 4, wherein deciding whether to stop operating the first and second decoders comprises:

- deciding to stop operating the first and second decoders if the Hamming distance is less than a predetermined threshold value.

(Note: Section [0081] in Levy)

9. In regard to claim 6, Chang teaches:

The method of claim 4, further comprising:

- prior to deciding whether to stop operating the first and second decoders, setting the threshold value equal to a value based on an earlier-determined Hamming distance,
- wherein deciding whether to stop operating the first and second decoders based on a comparison of the Hamming distance with the threshold value comprises deciding to stop operating the first and second decoders if the Hamming distance is greater than the threshold value.

(Note: Fig. 10, reference characters (920), (930), (945) & (960) in Chang)

10. In regard to claim 7, Chang teaches:

The method of claim 6, wherein the earlier-determined Hamming distance is determined from an earlier-generated output from the first decoder and an earlier-generated output from the second decoder, the earlier-generated outputs from the first and second decoders being generated during an immediately preceding half-iteration.

(Note; col. 10, lines (9-35) in Chang)

11. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang and further in view of Levy as applied to claim 1 above, and further in view of Taguchi US publication no. 2002/0183981 (Hereinafter Taguchi).

12. In regard to claim 8, Chang/Levy teach substantially all the limitations in claim 1. However, Chang/Levy does not teach:

- comparing soft values from the first decoder with soft values from the second decoder.

Tauguchi, in an analogous art, teaches Turbo decoding apparatus and decoding iteration count controlling method in Turbo decoding discloses:

- comparing soft values from the first decoder with soft values from the second decoder.

(Note: Section [0108] in Tauguchi)

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Tauguchi that comprise comparing soft values from the first decoder with soft values from the second decoder with the teaching of Chang/levy.

This modification would have been obvious to one of ordinary skill in the art, at the time the invention was made, because one of ordinary skill in the art would have recognized the need to include a decision whether or not to terminate iterations of soft decision in Turbo decoder.

13. In regard to claim 9, levy teaches:

The method of claim 8, wherein comparing soft values from the first decoder with soft values from the second decoder comprises:

- determining a distance between soft values from first decoder and soft values from second decoder.

(Note: Section [0081], lines (4-5) in Levy)

14. In regard to claim 10, Levy teaches:

The method of claim 9, wherein deciding whether to stop operating the first and second decoders by comparing the output from the first decoder with the output from the second decoder comprises:

- deciding to stop operating the first and second decoders based on a comparison of the distance with a threshold value.

(Note: Section [0081] in Levy)

15. In regard to claim 11, Levy teaches:

The method of claim 10, wherein deciding to stop operating the first and second decoders comprises:

- deciding to stop operating the first and second decoders if the distance is less than a predetermined threshold value.

(Note: Section [0081] in Levy)

16. In regard to claim 12, Levy teaches:

The method of claim 10, further comprising:

- prior to deciding whether to stop operating the first and second decoders,

- setting the threshold value equal to a value based on an earlier-determined distance,

(Note: claim 21, line 3 in Levy)

- wherein deciding whether to stop operating the first and second decoders based on a comparison of the distance with the threshold value comprises deciding to stop operating the first and second decoders if the distance is greater than the threshold value.

(Note: Section [0081] in Levy)

17. Claim 13 is rejected for the same reasons as per claim 7.

18. In regard to claim 14, Chang teaches:

The method of claim 1, further comprising:

- prior to the one or more of the m half-iterations, operating the first and second decoders in parallel for an initial number of half-iterations without deciding whether to stop operating the first and second decoders.

(Note: Fig. 5, reference characters (550) & (560) and col. 7, lines (32-55) in Chang)

19. Claim 15 is rejected for the same reasons as per claim 8.

20. In regard to claim 16, Chang teaches:

A method of decoding Turbo encoded information that comprises first systematic bits, first parity bits, second systematic bits, and second parity bits, the method comprising:

- supplying the first systematic bits (Fig. 6, reference character (611) in Chang) and the first parity bits (Fig. 6, reference characters (612) & (613) in Chang) to a first decoder (Fig. 6, reference character (420) in Chang);
- supplying the second systematic bits (Fig. 6, reference character (614) in Chang) and the second parity bits (Fig. 6, reference characters (615) & (616) in Change) to a second decoder (Fig. 6, reference character (430) in Chang);
- operating the first and second decoders in parallel for a number, m, of half-iterations, wherein m is greater than or equal to 1, wherein for each of the m half-iterations, the first decoder utilizes soft information supplied as an output from the second decoder in a preceding half-iteration, and the second decoder utilizes soft information supplied as an output from the first decoder in the preceding half-iteration;

(Note: Fig. 6, reference characters (420), (430), (460) & (470) and col. 4, lines (30-38) and flow chart of Fig. 10 in Chang)

However, Chang does not teach:

- after one or more of the m half-iterations, deciding whether to stop operating the first and second decoders based on a comparison of an output from the first decoder with an output from the second decoder and on an assessment of a reliability of decisions supplied at outputs of the first and second decoders.

Levy, teaches:

- after one or more of the m half-iterations, deciding whether to stop operating the first and second decoders based on a comparison of an output from the first decoder with an output from the second decoder and on an assessment of a reliability of decisions supplied at outputs of the first and second decoders.

(Note: Sections [0050] and [0058] (3-4) in Levy)

21. In regard to claim 17, Levy teaches:

The method of claim 16, wherein the assessment of the reliability of decisions supplied at outputs of the first and second decoders is performed in accordance with

$$y \quad \begin{cases} < & \text{OK} \\ > & \text{not OK} \end{cases} \quad \min\left\{\sum|S1,k|, \sum|S2,k|\right\}$$

where y is a threshold value, S1 is a soft output of the first decoder, S2 is a de-interleaved soft output of the second decoder, and S1,k and S2,k are the k: th components of S1 and , S2, respectively.

(Note: section [0079] in Levy)

22. Claim 18 is rejected for the same reasons as per claim 1.

23. Claim 19 is rejected for the same reasons as per claim 2.

24. Claim 20 is rejected for the same reasons as per claim 3.

25. Claim 21 is rejected for the same reasons as per claim 4.

26. Claim 22 is rejected for the same reasons as per claim 5.

27. Claim 23 is rejected for the same reasons as per claim 6.

28. Claim 24 is rejected for the same reasons as per claim 7.

29. Claim 25 is rejected for the same reasons as per claim 8.

30. Claim 26 is rejected for the same reasons as per claim 9.

31. Claim 27 is rejected for the same reasons as per claim 10.

32. Claim 28 is rejected for the same reasons as per claim 11.

33. Claim 29 is rejected for the same reasons as per claim 12.

34. Claim 30 is rejected for the same reasons as per claim 13.

35. Claim 31 is rejected for the same reasons as per claim 14.

36. Claim 32 is rejected for the same reasons as per claim 15.

37. Claim 33 is rejected for the same reasons as per claim 16.

39. Claim 34 is rejected for the same reasons as per claim 17.

40. Claim 35 is rejected for the same reasons as per claim 1.

41. Claim 36 is rejected for the same reasons as per claim 16.

Conclusion

42. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Rudolf et al. US publication no. 2004/0110473 teaches reliability detection of channel quality indicator and application to outer loop power control.

- Fukunaga et al. US patent no. 6185717 teaches: a data reception unit having improved robustness against code errors.
- Le Bars et al. US publication no. 2002/0041640 teaches method and device for evaluating the noise associated with turbo codes.
- Tong et al. US patent no. 6298461 teaches an iterative PCCC decoder.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Rizk whose telephone number is (571) 272-8191. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jacques Louis-Jacques can be reached on (571) 272-6962. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronics Business Center (EBC) at 866-217-9197 (toll-free)

Sam Rizk, MSEE, ABD

Examiner

ART UNIT 2112

5/31/07

GUY LAMARRE
PRIMARY EXAMINER